

Tetrodotoxin: Globalization of a local problem



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AIMS OF THIS STUDY

- ✓ To introduce what tetrodotoxin (TTX) is, how it works and its effects.
- ✓ To become acquainted about tetrodotoxism, an increasing problematic worldwide.
- ✓ To give a close idea of why this is an important issue and what the current situation is.

WHAT IS TETRODOTOXIN?

TTX is an important marine neurotoxin present in puffer fishes and some other species of cephalopods and amphibians (1, 2).

Puffer fish is native to Japan, where it is known as "fugu". Its meat is considered an exquisite meal and its consumption is very extended in the Asian countries. *Fugu* contains the toxin mainly in the liver and gonads, but also in some other viscera and skin (3).

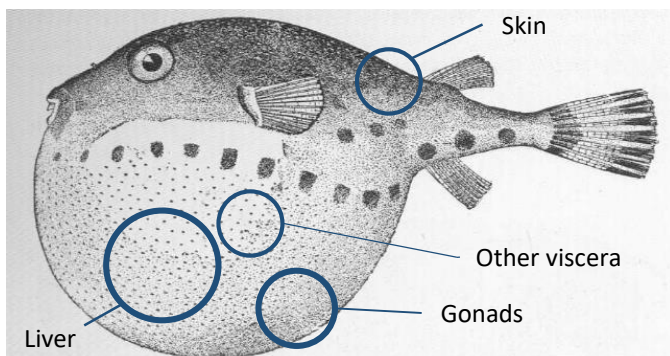


Figure 1. Puffer fish "fugu".

TETRODOTOXISM

Exposure can occur by ingestion, injection, inhalation and / or through damaged skin. The LD50 in humans is 8 mg/kg by intravenous inoculation, 30 mg/kg by ingestion and 2 mg/kg by inhalation (4).

Toxic dose is very variable, it depends on the amount of TTX ingested, the specimen in particular, the area where the fish comes from, the time of the year, etc. (5, 6).

TTX acts selectively blocking sodium channels, inhibiting nerve impulses and causing muscle paralysis (5, 7).

EPIDEMIOLOGY

Nowadays there are between 30 to 100 cases of TTX intoxications worldwide, annually (8). Approx. 75 of this computation occur only in Japan. 60% of poisonings are fatal (9).

Due to global climate change and the heating up of the waters, puffer fish are reaching the Mediterranean Sea from the Red Sea through the Suez canal (9).



Comparison of the TTX LD50 with some other known toxic agents.

TOXIC AGENT	LD50* (mg/kg)	TOXIC AGENT	LD50* (mg/kg)
Ethanol	3450	Cocaine	99
PCB	1900	Ricinus	30
Muscarine	750	Strychnine	2
Thiopental	600	TTX	0.334
Pentobar. sodium	239	Saxitoxin	0.263
Caffeine	127	TCDD	0.114

Table 1. Comparison of the TTX LD50 with some known toxic agents. Modified from ref. (10). *Lethal dose 50 measured in laboratory mouse. Orally.

SYMPTOMATOLOGY

The most common symptoms are: facial numbness, vomiting, delirium, dysphagia, gastroenteritis, dysarthria, progressive ascending muscle paralysis, cardiac arrhythmias and respiratory depression (11).

TREATMENT

There is no available antidote, therefore the only option of treatment is symptomatic treatment (11).

CONCLUSIONS

- ✓ Distribution of TTX is increasingly spreading due to migration of pufferfishes because of the climate change.
- ✓ Most poisonings occur in areas where there is no tradition or knowledge of these fish. Poisoning prevention should be done through education of population.

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